

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
540 S. MORRIS AVE., MONTGOMERY, AL 36115
GAMMA ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #1100243

Project: Dimock Residential GW Site, Dimock, PA
 Analysis method: Gamma Spectrometry
 Report ID: 1100243-GAMMA
 Report type: Original
 Date reported: 03/20/2012
 Total pages in report: 30

SAMPLES

NAREL Sample #	Client Sample ID	Location	Matrix	Date Collected	Date Received
B2.01194D	FB01	PA:DIMOCK	WATER-DRINKING	01/23/2012	01/26/2012
B2.01195E	HW19	PA:DIMOCK	WATER-DRINKING	01/23/2012	01/26/2012
B2.01196F	HW19-P	PA:DIMOCK	WATER-DRINKING	01/23/2012	01/26/2012
B2.01197G	FB05	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01198H	HW24-P	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01199J	FB03	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01200H	HW01	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01201J	HW02	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01202K	HW02Z	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01203L	HW08A	PA:DIMOCK	WATER-DRINKING	01/25/2012	01/31/2012
B2.01204M	HW04	PA:DIMOCK	WATER-DRINKING	01/24/2012	01/31/2012
B2.01205N	HW05	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01206P	HW12	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01207Q	HW14	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01208R	HW14-P	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01209T	FB04	PA:DIMOCK	WATER-DRINKING	01/26/2012	01/31/2012
B2.01210K	EB01	PA:DIMOCK	WATER-DRINKING	01/28/2012	01/31/2012
B2.01211L	HW17	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01212M	HW24	PA:DIMOCK	WATER-DRINKING	01/27/2012	01/31/2012
B2.01213N	FB02	PA:DIMOCK	WATER-DRINKING	01/24/2012	01/31/2012

EXCEPTIONS

1. **Packaging and shipping**—No problems were observed.
2. **Documentation**—No problems were observed.
3. **Sample preparation**—No problems were encountered.
4. **Analysis**—NAREL normally assumes that the radon daughter nuclides Pb-214 and Bi-214 in environmental matrices are in equilibrium with Ra-226 and therefore decay corrects the concentrations of those nuclides using the 1,600 year Ra-226 half life. For this project, the results of gross alpha/beta and radium analysis are inconsistent with that assumption, and the observed decay rate between replicate gamma analyses of the same aliquant performed on different days indicates that the parent contaminant is dissolved radon gas rather than Ra-226. Pb-214 and Bi-214 concentrations in water samples for this project were therefore decay corrected to the time of sample collection using the 3.842 day half life of their parent nuclide, Rn-222. Radon is known to slowly escape from plastic sample containers, therefore the actual concentrations at the time of sampling are likely higher than the measured concentrations. As stated earlier, a replicate analysis on the same sample

performed at a later time would be expected to result in somewhat lower measured Pb-214 and Bi-214 concentrations than the initial analysis.

Also, the gamma analyst used two different commercial software systems to analyze different samples in the same QC batch in order to keep turnaround times short. One software system calculates a minimum detectable concentration (MDC) but the other does not. NAREL is reporting the results as generated in this data package, but at the client's request NAREL will reanalyze the affected samples. However, the unsupported radon and its progeny will have decayed even more.

This entire SDG was reanalyzed as a result of method blank failures for Pb-212 and Tl-208. The results of the reanalyses are reported in this data package.

5. **Holding times**—No holding times were specified.

QUALITY CONTROL

1. **QC samples**—All QC analysis results met NAREL acceptance criteria.
2. **Instruments**—Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.

for

Mary F. Wisdom

Mary F. Wisdom

Quality Assurance Manager, NAREL

3/29/12

Date

John G. Griggs, Ph.D.

John G. Griggs, Ph.D.
Director, Center for Environmental Radioanalytical
Laboratory Science

Date

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity, 2-sigma uncertainty, and a sample-specific estimate of the MDC for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected above background with the exception of client requested nuclides of interest. The activity for each of the requested nuclides is reported whether negative, positive, or zero along with the associated 2-sigma uncertainty.

For this group of samples, NAREL used two different gamma analysis software systems. One system provides a sample-specific estimate of the MDC for every sample result. The other does not. The reader can tell which software was used for a particular sample by looking at the column labeled "MDC."

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

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SDG #1100243

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
 Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
B2.01194D		N/A	02/19/2012	0015732J	0008477L
B2.01195E		N/A	02/20/2012	0015732J	0008477L
B2.01196F		N/A	02/20/2012	0015732J	0008477L
B2.01197G		N/A	02/20/2012	0015732J	0008477L
B2.01198H		N/A	02/20/2012	0015732J	0008477L
B2.01199J		N/A	02/20/2012	0015732J	0008477L
B2.01200H		N/A	02/21/2012	0015732J	0008477L
B2.01200H	DUP	N/A	02/23/2012	0015732J	0008477L
B2.01201J		N/A	02/21/2012	0015732J	0008477L
B2.01202K		N/A	02/21/2012	0015732J	0008477L
B2.01203L		N/A	02/21/2012	0015732J	0008477L
B2.01204M		N/A	02/22/2012	0015732J	0008477L
B2.01205N		N/A	02/22/2012	0015732J	0008477L
B2.01206P		N/A	03/01/2012	0015732J	0008477L
B2.01207Q		N/A	03/01/2012	0015732J	0008477L
B2.01208R		N/A	03/01/2012	0015732J	0008477L
B2.01209T		N/A	03/01/2012	0015732J	0008477L
B2.01210K		N/A	03/01/2012	0015732J	0008477L
B2.01211L		N/A	03/01/2012	0015732J	0008477L
B2.01212M		N/A	03/01/2012	0015732J	0008477L
B2.01213N		N/A	03/02/2012	0015732J	0008477L
LCS-00631497A *	LCS	N/A	03/02/2012	0015732J	0008477L
RBK-00631498B *	RBK	N/A	03/01/2012	0015732J	0008477L

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

PREPARATION METHOD(S) USED

Procedure ID	Title

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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01194D	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/19/2012 15:18	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	2.69e+00	1.3e+01	2.2e+01	PCI/L	01/23/2012 14:42 EST
Bi214 *	7.89e+02	3.8e+02	4.9e+02	PCI/L	01/23/2012 14:42 EST
K40	6.98e+00	1.0e+01	1.7e+01	PCI/L	01/23/2012 14:42 EST
Pb214 *	1.15e+02	3.6e+02	6.3e+02	PCI/L	01/23/2012 14:42 EST
Ra226 *	2.99e+00	3.0e+01	5.2e+01	PCI/L	01/23/2012 14:42 EST
Ra228	-8.70e-01	4.1e+00	6.0e+00	PCI/L	01/23/2012 14:42 EST
Th234	-8.83e+01	7.3e+02	4.1e+02	PCI/L	01/23/2012 14:42 EST
U235 *	2.99e-01	1.1e+01	1.8e+01	PCI/L	01/23/2012 14:42 EST

* An asterisk indicates a result that may be significantly under or overestimated

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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01195E	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/19/2012 20:20	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Bi212	-6.23e+00	1.2e+01	2.0e+01	PCI/L	01/23/2012 17:47 EST
Bi214 *	6.82e+02	3.9e+02	5.0e+02	PCI/L	01/23/2012 17:47 EST
K40	1.31e+01	1.1e+01	1.8e+01	PCI/L	01/23/2012 17:47 EST
Pa234m	7.57e+01	8.1e+01	1.3e+02	PCI/L	01/23/2012 17:47 EST
Pb214 *	1.16e+03	4.4e+02	5.6e+02	PCI/L	01/23/2012 17:47 EST
Ra226 *	1.04e+00	3.0e+01	5.2e+01	PCI/L	01/23/2012 17:47 EST
Ra228	6.98e-01	3.7e+00	5.5e+00	PCI/L	01/23/2012 17:47 EST
Th234	-9.64e+01	8.5e+02	4.3e+02	PCI/L	01/23/2012 17:47 EST
U235 *	-2.00e+00	1.2e+01	1.7e+01	PCI/L	01/23/2012 17:47 EST

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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01196F	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/20/2012 01:22	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	1.39e+00	1.2e+01	2.1e+01	PCI/L	01/23/2012 19:07 EST
Bi214 *	8.10e+02	3.6e+02	4.9e+02	PCI/L	01/23/2012 19:07 EST
K40	3.05e+00	1.0e+01	1.7e+01	PCI/L	01/23/2012 19:07 EST
Pb214 *	6.95e+02	3.9e+02	6.4e+02	PCI/L	01/23/2012 19:07 EST
Ra226 *	-9.76e+00	6.0e+01	5.1e+01	PCI/L	01/23/2012 19:07 EST
Ra228	-3.17e+00	9.5e+00	6.4e+00	PCI/L	01/23/2012 19:07 EST
Th234	4.45e+01	2.5e+02	4.2e+02	PCI/L	01/23/2012 19:07 EST
Tl208	1.03e+00	1.1e+00	1.6e+00	PCI/L	01/23/2012 19:07 EST
U235 *	-9.38e+00	1.0e+01	1.6e+01	PCI/L	01/23/2012 19:07 EST

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**U.S.ENVIRONMENTAL PROTECTION AGENCY
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SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01197G	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/20/2012 06:24	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	-5.36e+00	1.3e+01	2.2e+01	PCI/L	01/27/2012 09:40 EST
Bi214 *	6.19e+01	1.7e+02	3.0e+02	PCI/L	01/27/2012 09:40 EST
K40	-2.35e+00	1.1e+01	1.7e+01	PCI/L	01/27/2012 09:40 EST
Pb214 *	4.21e+01	2.0e+02	3.5e+02	PCI/L	01/27/2012 09:40 EST
Ra226 *	-8.57e-01	3.1e+01	4.9e+01	PCI/L	01/27/2012 09:40 EST
Ra228	-1.43e+00	4.3e+00	5.5e+00	PCI/L	01/27/2012 09:40 EST
Th234	-2.49e+02	9.4e+02	3.5e+02	PCI/L	01/27/2012 09:40 EST
U235 *	-3.33e+00	1.2e+01	1.8e+01	PCI/L	01/27/2012 09:40 EST

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**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100243
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01198H	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/20/2012 11:25	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	4.60e+00	1.2e+01	2.1e+01	PCI/L	01/27/2012 13:18 EST
Bi214 *	3.49e+02	2.2e+02	2.9e+02	PCI/L	01/27/2012 13:18 EST
K40	-8.91e+00	1.5e+01	1.9e+01	PCI/L	01/27/2012 13:18 EST
Pb214 *	1.55e+02	1.8e+02	2.8e+02	PCI/L	01/27/2012 13:18 EST
Ra226 *	6.18e+00	2.9e+01	5.0e+01	PCI/L	01/27/2012 13:18 EST
Ra228	-2.29e-02	2.8e+00	4.9e+00	PCI/L	01/27/2012 13:18 EST
Th234	-1.51e+02	7.1e+03	3.8e+02	PCI/L	01/27/2012 13:18 EST
U235 *	4.77e+00	1.1e+01	1.8e+01	PCI/L	01/27/2012 13:18 EST

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**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01199J	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/20/2012 16:27	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	7.21e+00	1.2e+01	1.9e+01	PCI/L	01/25/2012 10:01 EST
Bi214 *	4.63e+00	2.9e+02	4.2e+02	PCI/L	01/25/2012 10:01 EST
K40	-6.05e+00	1.4e+01	1.8e+01	PCI/L	01/25/2012 10:01 EST
Pb214 *	-7.60e+01	4.2e+02	5.2e+02	PCI/L	01/25/2012 10:01 EST
Ra226 *	-2.12e+01	1.9e+02	5.2e+01	PCI/L	01/25/2012 10:01 EST
Ra228	-9.79e-01	4.4e+00	6.2e+00	PCI/L	01/25/2012 10:01 EST
Th234	-9.73e+01	8.5e+02	4.1e+02	PCI/L	01/25/2012 10:01 EST
U235 *	-4.45e+00	1.2e+01	1.8e+01	PCI/L	01/25/2012 10:01 EST

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**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01200H	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/20/2012 21:29	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	6.21e+00	1.2e+01	2.0e+01	PCI/L	01/25/2012 16:31 EST
Bi214 *	2.33e+02	2.3e+02	3.6e+02	PCI/L	01/25/2012 16:31 EST
K40	1.18e+01	1.2e+01	1.8e+01	PCI/L	01/25/2012 16:31 EST
Pb214 *	2.92e+02	3.0e+02	5.1e+02	PCI/L	01/25/2012 16:31 EST
Ra226 *	-8.37e+00	5.2e+01	5.0e+01	PCI/L	01/25/2012 16:31 EST
Ra228	2.73e-01	3.2e+00	6.0e+00	PCI/L	01/25/2012 16:31 EST
Th234	-1.82e+02	7.8e+03	4.1e+02	PCI/L	01/25/2012 16:31 EST
U235 *	6.53e-01	8.0e+00	1.3e+01	PCI/L	01/25/2012 16:31 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01200H	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/22/2012 11:28	1000.0	GE04	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Bi212	2.20e+01	1.8e+01	2.9e+01	PCI/L	01/25/2012 16:31 EST
Bi214 *	2.90e+02	5.4e+02	8.0e+02	PCI/L	01/25/2012 16:31 EST
K40	3.49e+00	2.2e+01	3.4e+01	PCI/L	01/25/2012 16:31 EST
Pb214 *	-4.73e+02	1.0e+03	8.1e+02	PCI/L	01/25/2012 16:31 EST
Ra226 *	-1.66e+01	4.1e+01	5.6e+01	PCI/L	01/25/2012 16:31 EST
Ra228	-2.16e+00	8.4e+00	9.5e+00	PCI/L	01/25/2012 16:31 EST
Th234	3.01e+01	8.2e+01	1.4e+02	PCI/L	01/25/2012 16:31 EST
U235 *	-1.63e+00	1.2e+01	1.5e+01	PCI/L	01/25/2012 16:31 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01201J	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/21/2012 02:31	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Bi212	-6.68e-01	1.2e+01	2.1e+01	PCI/L	01/25/2012 12:58 EST
Bi214 *	7.82e+02	3.2e+02	4.3e+02	PCI/L	01/25/2012 12:58 EST
K40	8.87e+00	1.1e+01	1.7e+01	PCI/L	01/25/2012 12:58 EST
Pb214 *	4.02e+02	3.6e+02	5.2e+02	PCI/L	01/25/2012 12:58 EST
Ra226 *	-1.25e+01	7.8e+01	5.3e+01	PCI/L	01/25/2012 12:58 EST
Ra228	1.47e-01	2.9e+00	5.1e+00	PCI/L	01/25/2012 12:58 EST
Th234	-1.57e+02	3.7e+03	3.3e+02	PCI/L	01/25/2012 12:58 EST
U235 *	2.06e+00	1.0e+01	1.7e+01	PCI/L	01/25/2012 12:58 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100243
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01202K	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/21/2012 11:35	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	2.48e+00	1.2e+01	2.1e+01	PCI/L	01/25/2012 12:59 EST
Bi214 *	7.11e+02	3.2e+02	4.4e+02	PCI/L	01/25/2012 12:59 EST
K40	7.82e+00	1.1e+01	1.8e+01	PCI/L	01/25/2012 12:59 EST
Pb214 *	8.28e+02	4.0e+02	5.4e+02	PCI/L	01/25/2012 12:59 EST
Ra226 *	6.98e+00	2.9e+01	5.0e+01	PCI/L	01/25/2012 12:59 EST
Ra228	-1.70e+00	5.2e+00	6.0e+00	PCI/L	01/25/2012 12:59 EST
Th234	-1.58e+02	4.5e+03	4.1e+02	PCI/L	01/25/2012 12:59 EST
U235 *	-1.07e-01	1.1e+02	1.7e+01	PCI/L	01/25/2012 12:59 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100243
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01203L	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/21/2012 16:37	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	4.64e+00	1.2e+01	2.0e+01	PCI/L	01/25/2012 11:46 EST
Bi214 *	3.51e+02	2.9e+02	4.5e+02	PCI/L	01/25/2012 11:46 EST
K40	-4.24e+00	1.4e+01	1.9e+01	PCI/L	01/25/2012 11:46 EST
Pa234m	1.14e+02	8.5e+01	1.3e+02	PCI/L	01/25/2012 11:46 EST
Pb214 *	1.04e+02	3.7e+02	6.4e+02	PCI/L	01/25/2012 11:46 EST
Ra226 *	3.88e-01	3.0e+01	5.1e+01	PCI/L	01/25/2012 11:46 EST
Ra228	-2.93e-02	2.9e+00	5.6e+00	PCI/L	01/25/2012 11:46 EST
Th234	-1.76e+02	9.7e+05	4.2e+02	PCI/L	01/25/2012 11:46 EST
U235 *	-5.99e+00	1.1e+01	1.8e+01	PCI/L	01/25/2012 11:46 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100243
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01204M	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/21/2012 21:39	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	6.64e+00	1.1e+01	1.9e+01	PCI/L	01/24/2012 14:33 EST
Bi214 *	7.03e+02	5.0e+02	6.4e+02	PCI/L	01/24/2012 14:33 EST
K40	6.11e-01	1.1e+01	1.8e+01	PCI/L	01/24/2012 14:33 EST
Pb214 *	1.27e+02	4.3e+02	7.6e+02	PCI/L	01/24/2012 14:33 EST
Ra226 *	4.49e+00	2.9e+01	4.9e+01	PCI/L	01/24/2012 14:33 EST
Ra228	-2.97e+00	7.1e+00	5.6e+00	PCI/L	01/24/2012 14:33 EST
Th234	-1.79e+02	2.4e+04	4.0e+02	PCI/L	01/24/2012 14:33 EST
U235 *	2.14e-01	1.1e+01	1.8e+01	PCI/L	01/24/2012 14:33 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100243
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01205N	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/22/2012 02:40	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	3.69e+00	1.2e+01	2.0e+01	PCI/L	01/26/2012 11:35 EST
Bi214 *	1.42e+03	4.1e+02	4.7e+02	PCI/L	01/26/2012 11:35 EST
K40	1.28e+01	1.3e+01	1.8e+01	PCI/L	01/26/2012 11:35 EST
Pa234m	7.72e+01	8.6e+01	1.4e+02	PCI/L	01/26/2012 11:35 EST
Pb214 *	1.73e+03	5.1e+02	5.6e+02	PCI/L	01/26/2012 11:35 EST
Ra226 *	-1.41e+01	8.9e+01	5.3e+01	PCI/L	01/26/2012 11:35 EST
Ra228	2.13e+00	4.4e+00	6.0e+00	PCI/L	01/26/2012 11:35 EST
Th234	-2.20e+02	1.8e+03	3.7e+02	PCI/L	01/26/2012 11:35 EST
U235 *	-3.54e+00	1.2e+01	1.9e+01	PCI/L	01/26/2012 11:35 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01206P	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/29/2012 20:48	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	-7.49e-01	1.2e+01	2.0e+01	PCI/L	01/26/2012 13:23 EST
Bi214 *	-7.32e+02	1.9e+03	1.9e+03	PCI/L	01/26/2012 13:23 EST
K40	4.99e+00	1.2e+01	1.9e+01	PCI/L	01/26/2012 13:23 EST
Pb214 *	-8.11e+02	3.3e+03	2.4e+03	PCI/L	01/26/2012 13:23 EST
Ra226 *	2.92e+00	2.9e+01	5.0e+01	PCI/L	01/26/2012 13:23 EST
Ra228	-2.48e+00	6.9e+00	6.1e+00	PCI/L	01/26/2012 13:23 EST
Th234	-2.22e+02	2.3e+04	5.1e+02	PCI/L	01/26/2012 13:23 EST
U235 *	6.29e+00	9.0e+00	1.5e+01	PCI/L	01/26/2012 13:23 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01207Q	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/01/2012 01:50	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	9.34e+00	1.2e+01	2.0e+01	PCI/L	01/26/2012 17:13 EST
Bi214 *	6.94e+02	1.3e+03	1.8e+03	PCI/L	01/26/2012 17:13 EST
K40	-8.28e+00	1.6e+01	1.8e+01	PCI/L	01/26/2012 17:13 EST
Pb214 *	-4.80e+02	2.1e+03	2.3e+03	PCI/L	01/26/2012 17:13 EST
Ra226 *	1.44e+01	2.9e+01	4.9e+01	PCI/L	01/26/2012 17:13 EST
Ra228	2.78e+00	4.5e+00	5.9e+00	PCI/L	01/26/2012 17:13 EST
Th234	-1.68e+02	2.4e+03	5.2e+02	PCI/L	01/26/2012 17:13 EST
U235 *	-3.43e+00	1.2e+01	1.8e+01	PCI/L	01/26/2012 17:13 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100243
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01208R	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/29/2012 11:22	1000.0	GE03	RCL

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	-5.97e+00	1.5e+01		PCI/L	01/26/2012 19:15 EST
Bi214 *	-1.12e+03	1.6e+03		PCI/L	01/26/2012 19:15 EST
K40	6.39e+00	1.7e+01		PCI/L	01/26/2012 19:15 EST
Pb212	5.02e-01	2.4e+00		PCI/L	01/26/2012 19:15 EST
Pb214 *	9.62e+02	1.4e+03		PCI/L	01/26/2012 19:15 EST
Ra226 *	4.83e+00	3.1e+01		PCI/L	01/26/2012 19:15 EST
Ra228	-6.14e-01	4.9e+00		PCI/L	01/26/2012 19:15 EST
Th234 *	-8.00e+00	5.7e+01		PCI/L	01/26/2012 19:15 EST
U235 *	-1.45e+01	9.3e+00		PCI/L	01/26/2012 19:15 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01209T	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/29/2012 11:22	1000.0	GE15	RCL

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	-2.44e+01	1.8e+01		PCI/L	01/26/2012 09:13 EST
Bi214 *	1.31e+02	1.5e+03		PCI/L	01/26/2012 09:13 EST
K40	-3.85e+00	1.4e+01		PCI/L	01/26/2012 09:13 EST
Pb212	2.31e+00	3.2e+00		PCI/L	01/26/2012 09:13 EST
Pb214 *	6.55e+02	1.5e+03		PCI/L	01/26/2012 09:13 EST
Ra226 *	4.92e+01	2.3e+01		PCI/L	01/26/2012 09:13 EST
Ra228	-1.66e-01	5.2e+00		PCI/L	01/26/2012 09:13 EST
Th234 *	9.19e+01	2.2e+01		PCI/L	01/26/2012 09:13 EST
U235 *	-2.23e+01	7.9e+00		PCI/L	01/26/2012 09:13 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01210K	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/29/2012 11:22	1000.0	GE16	RCL

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	-4.49e+00	9.7e+00		PCI/L	01/28/2012 11:26 EST
Bi214 *	-1.76e+02	7.4e+02		PCI/L	01/28/2012 11:26 EST
K40	6.64e+00	8.4e+00		PCI/L	01/28/2012 11:26 EST
Pb212	6.74e-01	1.2e+00		PCI/L	01/28/2012 11:26 EST
Pb214 *	1.25e+02	5.2e+02		PCI/L	01/28/2012 11:26 EST
Ra226 *	7.29e+00	2.0e+01		PCI/L	01/28/2012 11:26 EST
Ra228	1.60e+00	2.6e+00		PCI/L	01/28/2012 11:26 EST
Th234 *	-1.19e+01	1.6e+01		PCI/L	01/28/2012 11:26 EST
U235 *	-1.84e+01	5.0e+00		PCI/L	01/28/2012 11:26 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01211L	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/29/2012 11:22	1000.0	GE22	RCL

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	7.32e+00	1.4e+01		PCI/L	01/27/2012 11:40 EST
Bi214 *	1.02e+03	1.1e+03		PCI/L	01/27/2012 11:40 EST
K40	7.80e+00	1.1e+01		PCI/L	01/27/2012 11:40 EST
Pb212	-3.55e-01	2.0e+00		PCI/L	01/27/2012 11:40 EST
Pb214 *	1.36e+03	1.0e+03		PCI/L	01/27/2012 11:40 EST
Ra226 *	1.57e+01	2.3e+01		PCI/L	01/27/2012 11:40 EST
Ra228	2.03e+00	4.3e+00		PCI/L	01/27/2012 11:40 EST
Th234 *	-1.99e+01	2.9e+01		PCI/L	01/27/2012 11:40 EST
U235 *	-1.21e+01	5.9e+00		PCI/L	01/27/2012 11:40 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100243
SAMPLE ANALYSIS REPORT**

Sample #:	B2.01212M	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/01/2012 15:37	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	4.42e+00	1.2e+01	2.1e+01	PCI/L	01/27/2012 12:09 EST
Bi214 *	-8.04e+02	2.2e+03	2.0e+03	PCI/L	01/27/2012 12:09 EST
K40	-1.03e+01	1.5e+01	1.9e+01	PCI/L	01/27/2012 12:09 EST
Pb214 *	6.40e+02	1.2e+03	1.8e+03	PCI/L	01/27/2012 12:09 EST
Ra226 *	-1.46e+00	3.2e+01	5.0e+01	PCI/L	01/27/2012 12:09 EST
Ra228	-1.73e+00	5.5e+00	6.2e+00	PCI/L	01/27/2012 12:09 EST
Th234	-2.88e+02	1.8e+03	4.5e+02	PCI/L	01/27/2012 12:09 EST
U235 *	6.67e-01	7.8e+00	1.3e+01	PCI/L	01/27/2012 12:09 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	B2.01213N	QC batch #:	0008477L
Matrix:	WATER-DRINKING	Assay batch #:	0015732J
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/01/2012 20:39	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2\sigma$ Uncertainty	MDC	Unit	Date
Bi212	5.22e-01	1.2e+01	2.1e+01	PCI/L	01/24/2012 12:11 EST
Bi214 *	-1.07e+03	2.5e+03	2.9e+03	PCI/L	01/24/2012 12:11 EST
K40	2.55e+00	1.1e+01	1.8e+01	PCI/L	01/24/2012 12:11 EST
Pa234m	7.49e+01	8.6e+01	1.4e+02	PCI/L	01/24/2012 12:11 EST
Pb214 *	-1.25e+03	5.1e+03	4.0e+03	PCI/L	01/24/2012 12:11 EST
Ra226 *	7.11e+00	2.9e+01	4.9e+01	PCI/L	01/24/2012 12:11 EST
Ra228	-1.70e+00	5.3e+00	6.1e+00	PCI/L	01/24/2012 12:11 EST
Th234	-2.03e+02	4.3e+03	5.7e+02	PCI/L	01/24/2012 12:11 EST
U235 *	-3.17e+00	1.2e+01	1.8e+01	PCI/L	01/24/2012 12:11 EST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100243
SAMPLE ANALYSIS REPORT**

Sample #:	LCS-00631497A	QC batch #:	0008477L
Matrix:	N/A	Assay batch #:	0015732J
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/02/2012 01:41	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi207	3.71e+03	4.0e+02	1.2e+01	PCI	12/15/2010 11:00 CST
Bi212	-2.67e+01	1.1e+02	1.8e+02	PCI	12/15/2010 11:00 CST
Bi214 *	-1.02e+01	7.5e+01	2.1e+01	PCI	12/15/2010 11:00 CST
Co60	4.73e+00	4.3e+00	7.0e+00	PCI	12/15/2010 11:00 CST
Eu155	8.62e+02	1.2e+02	8.2e+01	PCI	12/15/2010 11:00 CST
K40	4.45e+01	4.5e+01	8.0e+01	PCI	12/15/2010 11:00 CST
Pb214 *	-5.43e+00	6.2e+01	3.6e+01	PCI	12/15/2010 11:00 CST
Ra226 *	-1.69e+00	2.4e+02	3.8e+02	PCI	12/15/2010 11:00 CST
Ra228	6.79e+00	2.7e+01	4.6e+01	PCI	12/15/2010 11:00 CST
U235 *	-3.34e+01	6.8e+01	1.1e+02	PCI	12/15/2010 11:00 CST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG #1100243

SAMPLE ANALYSIS REPORT

Sample #:	RBK-00631498B	QC batch #:	0008477L
Matrix:	N/A	Assay batch #:	0015732J
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/01/2012 10:35	300.0	GE14	MO

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212	7.09e+00	3.5e+01	6.0e+01	PCI	02/17/2012 07:00 CST
Bi214 *	-9.49e+01	3.0e+02	1.4e+02	PCI	02/17/2012 07:00 CST
K40	2.83e+01	3.7e+01	5.4e+01	PCI	02/17/2012 07:00 CST
Pb212	7.33e+00	7.0e+00	1.0e+01	PCI	02/17/2012 07:00 CST
Pb214 *	-2.59e+01	1.2e+02	1.4e+02	PCI	02/17/2012 07:00 CST
Ra226 *	4.63e+01	8.4e+01	1.4e+02	PCI	02/17/2012 07:00 CST
Ra228	-5.19e+00	1.5e+01	1.8e+01	PCI	02/17/2012 07:00 CST
Th234	-3.44e+02	3.2e+04	6.9e+02	PCI	02/17/2012 07:00 CST
U235 *	1.41e+01	2.9e+01	4.9e+01	PCI	02/17/2012 07:00 CST

* An asterisk indicates a result that may be significantly under or overestimated

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

SDG 1100243

QC BATCH SUMMARY

QC batch #: 0008477L
 Preparation procedure: N/A
 Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	$\pm 2 \sigma$ Uncertainty (%)	Analyst
B2.01194D		N/A		RCL
B2.01195E		N/A		RCL
B2.01196F		N/A		RCL
B2.01197G		N/A		RCL
B2.01198H		N/A		RCL
B2.01199J		N/A		RCL
B2.01200H		N/A		RCL
B2.01200H	DUP	N/A		RCL
B2.01201J		N/A		RCL
B2.01202K		N/A		RCL
B2.01203L		N/A		RCL
B2.01204M		N/A		RCL
B2.01205N		N/A		RCL
B2.01206P		N/A		RCL
B2.01207Q		N/A		RCL
B2.01208R		N/A		RCL
B2.01209T		N/A		RCL
B2.01210K		N/A		RCL
B2.01211L		N/A		RCL
B2.01212M		N/A		RCL
B2.01213N		N/A		RCL
LCS-00631497A *	LCS	N/A		RCL
RBK-00631498B *	RBK	N/A		RCL

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory
QC Batch Report

QC Batch #: 0008477L

Analytical Method: NAREL GAM-01

METHOD BLANKS (PCI)

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date	Flags
00631498B	BI212	7.09e+00 \pm 3.5e+01	2012-02-17	OK
00631498B	BI214	-9.49e+01 \pm 3.0e+02	2012-02-17	J
00631498B	K40	2.83e+01 \pm 3.7e+01	2012-02-17	OK
00631498B	PB212	7.33e+00 \pm 7.0e+00	2012-02-17	WARN
00631498B	PB214	-2.59e+01 \pm 1.2e+02	2012-02-17	J
00631498B	RA226	4.63e+01 \pm 8.4e+01	2012-02-17	J
00631498B	RA228	-5.19e+00 \pm 1.5e+01	2012-02-17	OK
00631498B	TH234	-3.44e+02 \pm 3.2e+04	2012-02-17	OK
00631498B	U235	1.41e+01 \pm 2.9e+01	2012-02-17	J

LABORATORY DUPLICATES (PCI/L)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
B2.01200H	BI212	6.21e+00 \pm 1.2e+01	2.20e+01 \pm 1.8e+01	112.06	1.46 OK
B2.01200H	BI214	2.33e+02 \pm 2.3e+02	2.90e+02 \pm 5.4e+02	21.79	0.19 OK
B2.01200H	K40	1.18e+01 \pm 1.2e+01	3.49e+00 \pm 2.2e+01	108.82	-0.66 OK
B2.01200H	PB214	2.92e+02 \pm 3.0e+02	-4.73e+02 \pm 1.0e+03	0.00	-1.43 OK
B2.01200H	RA226	-8.37e+00 \pm 5.2e+01	-1.66e+01 \pm 4.1e+01	0.00	-0.25 OK
B2.01200H	RA228	2.73e-01 \pm 3.2e+00	-2.16e+00 \pm 8.4e+00	0.00	-0.54 OK
B2.01200H	TH234	-1.82e+02 \pm 7.8e+03	3.01e+01 \pm 8.2e+01	0.00	0.05 OK
B2.01200H	U235	6.53e-01 \pm 8.0e+00	-1.63e+00 \pm 1.2e+01	0.00	-0.32 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00631497A	BI207	3.95e+03 \pm 3.9%	3.71e+03 \pm 4.0e+02	94.03	-1.09 OK
00631497A	BI212	NO SPIKE DATA			
00631497A	BI214	NO SPIKE DATA			
00631497A	CO60	NO SPIKE DATA			
00631497A	EU155	8.57e+02 \pm 5.7%	8.62e+02 \pm 1.2e+02	100.59	0.08 OK
00631497A	K40	NO SPIKE DATA			
00631497A	PB214	NO SPIKE DATA			
00631497A	RA226	NO SPIKE DATA			
00631497A	RA228	NO SPIKE DATA			
00631497A	U235	NO SPIKE DATA			

Analyst:

R.C. Lowry

3-14-12

K. Mitchell D.
3/14/12

QA Officer:

Kimberly M. Lowry

3/14/12

With "J" Flags no
3/14/12